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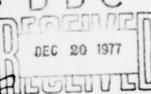AD A047762

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HUMAN RESOURCES

VOCATIONAL INTEREST-CAREER EXAMINATION:

NORMING AND STANDARDIZATION ON A NATIONWIDE HIGH SCHOOL SAMPLE

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The Vocational Interest-Career Examination (VOICE), a general purpose interest inventory developed by the Air Force for use in vocational and technical counseling, was standardized on a nationwide sample of high school students. This report describes the sample design, data collection and statistical analysis. Raw score norms are provided for subsamples identified by school grade, sex, ethnic background and geographic region.

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I. INTRODUCTION

The Air Force Vocational Interest-Career Examination (VOICE)
was developed to enhance the assessment process relating to job assign-
ment in the Air Force. The initial efforts to construct this instru-
ment were performed under contract with the Educational Testing
Service (Echternacht, Reilly, and McCaffrey, 1973). The VOICE was
further developed by grouping item responses into 18 homogeneous
subscales (Alley, Berberich, and Wilbourn, 1976). In addition to
its use within the Air Force, its utility in the joint services high
school testing program has also been considered. A study, relating
the VOICE to reported job satisfaction, found moderate but highly
consistent relationships between VOICE scale scores and job satis-
faction data collected approximately one year later (Alley, Wilbourn,
and Berberich, 1976). These results support the case for using VOICE
as an adjunct to the standardized aptitude assessment program. The
report that follows describes a project undertaken to implement one
of the recommendations in the 1976 study: to norm and standardize
the interest composites.

The overall purpose of the present study was to standardize the
Air Force vocational interest inventory, the VOICE, on a nationwide
high school sample of 10th, 11th, and 12th graders so that the VOICE
might be calibrated with respect to the total Air Force applicant
pool. A specific purpose of the study was to develop separate norms
for subsamples identified by school grade, sex, ethnic background
and geographic area. Three major tasks were involved: sample
construction, VOICE administration, and data analysis.

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II. APPROACH

Sampling Design

A major consideration in the multistage cluster sampling plan designed for this study was geographic area norms. To preclude an unrealistic multiplicity of sampling cells, the nine U.S. Continental census regions were combined into five. Table 1 lists the states in these regions. The first stage in the sampling was to select clusters of schools within regions that were approximately proportionate to the numbers of urban and rural public and private high schools in each and to size of enrollment. The intent of the second stage was to select randomly equal numbers of Black and non-Black male and female students within each grade level: 10, 11 and 12.

Schools. The stratification variables of region, population density, type of control, and enrollment size were designed to obtain a sample of schools approximately proportionate to the actual number of U.S. high schools in each of the resulting cells. The variables were stratified as follows:

Regions: Northeast, Southeast, Central, Mountain West, and
Pacific West
Population Density: Urban; Rural
Type of Control: Public; Private
Enrollment Size [1]: 300 to 2,000; over 2,000

A strong consideration in the sampling plan was the likelihood of obtaining a sufficient number of Black students. Originally, equal numbers of Black and non-Black students in the sample were envisioned, rather than proportional numbers. To achieve even a proportionate representation of Blacks, however, it was necessary to design a plan that would maximize the probability of their selection. The racial composition of secondary schools is not available on computer tape sampling data bases, so the following strategy was employed in selecting schools. First, the regional strata of the sample were

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[1]The enrollment size constraints were for public schools only.

Table 1. Distribution of States in Five Regions

Pacific West	Central	Northeast
Washington	North Dakota	New York
Oregon	South Dakota	Pennsylvania
California	Nebraska	Maine
	Kansas	New Hampshire
Mountain West	Oklahoma	Vermont
	Texas	Massachusetts
Idaho	Mississippi	Connecticut
Montana	Minnesota	Rhode Island
Nevada	Iowa	New Jersey
Utah	Missouri	
Colorado	Arkansas	**Southeast**
Arizona	Louisiana	
New Mexico	Kentucky	Delaware
Wyoming	Alabama	Maryland
	Wisconsin	Virginia
	Illinois	West Virginia
	Michigan	North Carolina
	Indiana	South Carolina
	Ohio	Georgia
	Tennessee	Florida

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adjusted to emphasize those regions that have a higher proportion of Black students. The target number of schools from each region paralleled approximately the relative concentrations of Black students.

The second feature of the strategy required that within each region 50 percent of the schools would be selected from the five largest cities. With 50 percent coming from metropolitan areas the likelihood was increased that Black students would be selected for the sample.

The third feature concerned size of school enrollment. All schools selected were limited to those with 300 or more students (the same criterion employed by the Health Education and Welfare Office of Civil Rights). This limitation would result in a higher probability of selecting schools in more densely populated areas, where minority groups tend to be concentrated. An effect of limiting public school size in this way is to leave approximately 10 percent of rural schools out of the rural school sampling frame. However, the representation in terms of number of rural students from this size school is quite small, and the consideration of obtaining a sufficient number of Black students overrode the effect of underrepresenting the smaller schools.

Students. The selection of students was designed to obtain a total sample size of 12,000 with approximately equal numbers in each subsample. School officials were asked to select randomly 33 male and 33 female students from each of the three grade enrollment lists, a total of 198 students per school. (If a private school had an anrollment of fewer than 200 students, the total enrollment was requested for the sample.) Ethnic grouping; i.e., Black/non-Black, was to be a classification variable after the sampling had been guided directly by the strata mentioned above.

Sources of information. A printout listing all public schools in the U.S. which offer at least 10th, 11th and 12th grade classes was used as the sampling base. Enrollment sizes were given, which permitted dividing the base into small schools (300--2,000 students) and large (over 2,000). A Rand McNally atlas was used to determine whether

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a school was rural or urban, using the U.S. Bureau of the Census definition of rural: communities with populations less than 2,500 and at least 50 miles from an urban location.

The Digest of Educational Statistics (Grant & Line, 1974) was used to find the number of public and private high schools in the continental U.S. Information on private schools was obtained from the County and City Date Book (Department of Commerce, 1972). The population of 10th, 11th and 12th graders in each U.S. region was derived from age data in the 1970 Census of Population.

The data gathered on numbers of public and private schools, urban and rural schools, students at each grade level, and school size provided the base for school selection within each region. Ratios were computed so that each of these variables was represented proportionately to their base, with the exceptions noted above. To compensate for refusals to participate, more than three times as many schools were selected as were required for the sample.

Arrangements for Participation

The best laid plans of sampling designers can only be implemented if the sample selected agrees to cooperate. To achieve the desired rate of participation and quality of response, attempts were made to develop positive interactions between the researchers and the officials of the selected schools. These included:

1. A detailed letter of introduction and invitation to participate emphasizing student anonymity and offering feedback to the students in the form of individual interest profiles. Response forms and addressed envelopes with return postage were enclosed.

2. If the school principal indicated that clearance had to be obtained from a state or local educational research department,

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a package containing the introductory letter, a set of sampling and administration instructions, and a copy of VOICE were sent to the appropriate agency for approval.

3. Follow-up letters and phone calls were made to all those who did not return response forms.

4. Letters were sent to a second sample drawn from areas where insufficient agreements were obtained.

5. Follow-up calls were made to participating school officials to arrange for the details of the test administration. At this time options were offered with respect to ways of conducting the VOICE administration: a representative of Psychometrics or a member of the school staff. If the latter, the school would be paid a minimum of $75.00 for sampling the students and administering VOICE. Advance copies of the sampling and administration instructions were sent to indicate the extent of the task.

6. Materials were sent to the schools doing their own admin-istration. These included detailed instructions; VOICE questionnaires; answer sheets; student identification con-trol sheets; mailing labels for return of answer sheets to Air Force Human Resources Laboratory for entry onto tapes and return of control sheets to Psychometrics; and return postage.

7. If materials were not returned within three weeks after they were due, a phone call was made to the contact person at the school in question to see if there was a problem that could be resolved.

Every effort was made to dissipate anxieties concerning the uses to which test results would be put. To provide support and encouragement for the study personal contact was made with minority civic groups (in locations where they could help) who were interested in advancing job-related research involving their communities.

Data Analysis

The statistical analysis involved data editing and scoring as
preliminary steps. The VOICE Op Scan answer sheets were read directly
by machine and the responses were recorded in input order on magnetic
tape at AFHRL facilities. Considerable editing of the answer sheets
was necessary to detect errors and salvage tests that were filled in
with pen or were otherwise unscannable. The computer scoring of the
VOICE scales provided additional checking and error detection. The
control sheets containing participating students' identification
numbers (which was a code for region and school, as well), sex, grade,
and ethnic background provided a means of checking the accuracy of the
assignment of answer sheets to their proper categories for norming.
Test data were not entered into the data base until errors were
resolved.

Statistics. VOICE scale score means and standard deviations
were computed for 60 subsamples: five regions, three grades, two
sexes, and two ethnic categories. The differences between means were
tested for significance by the t statistic. Norms (T-scores) were
planned for groups with sample sizes of at least 100. The population
size, respective to each subsample was determined from census data to
weight means and norms, where appropriate.

The computation of descriptive statistics involved the weighting
of subsamples relative to their populations prior to any summary or
combination of data. An estimate of the actual population in each
cell was obtained from the most recent census data (1970). The total
population has increased, but probably no unusual regional shifts have
occurred. The census figures are given for secondary schools by state
for ethnic and male-female groups, making it possible to derive
regional statistics for Black and non-Black males and females. Second-
ary school populations are not broken down by grade, however; so
estimates were made of the percents in grades 10, 11 and 12 based on
the assumption of declining enrollment. For example, the population

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of males in 4-year high schools were summed across the states within
a region. Ninth graders (not studied in this project) were assumed
to account for 28% of the whole; 10th--26%, 11th--24%, and 12th--22%.
The basis for this assumption was the relative proportion of students
in each grade reported by the 85 school principals and counselors in
the selected sample.

The closest estimate of the number of Blacks and other races
for each sex at each grade level was the proportion of Blacks to
other races in the total population for that state or region. The
estimated population per cell and the actual sample for each cell is
reported in Table 2. The total number of students completing scorable
VOICE answer sheets was 12,146, or .1 percent (rounded) of the national
population of students in grades 10 to 12 (10,347,000). To compute
national group means, then, the obtained number in each cell was
weighted by the ratio of one-thousandth of the population for that
group to the obtained number ($\frac{N}{1000}/n$). Similarly, the population $\frac{N}{1000}$
was used in combining variances over cells for reporting standard
deviations.

__Norms__. Normative statistics were computed for each of the 18
VOICE scales. The means and standard deviations were adjusted by the
ratio of population to obtained sample numbers for each cell. The
normative information is available as a separate document from AFHRL.

III. RESULTS

The Sample

__Schools__. Agreements were received from 85 schools, but the
testing program was completed by 68. (Reasons offered by the non-
respondents are given in the Discussion section.) The distribution
of schools across strata of interest may be seen in Table 3.

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Table 2. VOICE Sample and Population Sizes[a]

Grade	10				11				12			
Race	Black		Other		Black		Other		Black		Other	
Sex	M	F	M	F	M	F	M	F	M	F	M	F
Region:												
Northeast n	6	2	281	282	7	3	297	226	4	40	240	245
N	36.7	41.9	389.8	419.2	33.9	38.7	359.7	386.8	31.0	35.5	329.5	354.4
Southeast n	75	98	240	236	65	69	285	262	72	47	258	273
N	49.6	54.0	210.4	217.2	45.6	49.7	193.7	200.0	42.0	45.8	178.3	184.1
Central n	219	182	652	635	159	173	560	614	161	162	576	572
N	90.8	100.0	721.5	755.1	84.1	92.6	667.7	698.9	76.8	84.6	610.2	638.7
Mountain n	7	9	343	348	6	14	336	311	10	5	332	341
N	1.9	1.8	81.4	83.1	1.7	1.6	75.0	76.5	1.6	1.5	68.6	70.0
Pacific n	66	40	244	258	63	56	243	258	45	52	232	243
N	13.9	14.4	223.0	229.7	12.8	13.4	206.5	212.7	11.7	12.2	188.8	194.5

[a] n = obtained number tested
N = population in thousands

Table 3. Number of Schools by Stratification Variable

School Type	School Size	Northeast	Southeast	Central	Mountain	Pacific	National Total
URBAN							
Public	Large	1	5	2	2	1	11
Public	Small	3	5	11	6	6	31
Private	(NA)	2	1	2	1	1	7
RURAL							
Public	Large	-	-	-	-	-	0
Public	Small	3	2	11	2	1	19
Total		9	13	26	11	9	68

Students. The number of students who provided scorable VOICE tests in each national and regional category of interest is shown in Tables 4, 5, and 6. It was clear from Table 2 that certain cells in the original grade x sex x race x region breakdown were insufficiently sampled to compute reliable norms. The various sets of marginals, however, were very well represented (Tables 4 through 6).

Table 4 presents male and female sample-to-population ratios across regions. In absolute numbers the best represented region is the Mountain West as a result of oversampling to compensate for its having the smallest population. The poorest representation was for the populous Northeast region, where severe economic constraints operated to preclude the "luxury" of participation in research projects. There were slightly more males than females in the total sample, but this difference was not a consistent trend across regions.

Table 4. Region by Male/Female: Samples and Respective Populations[a]

		Northeast	Southeast	Central	Mountain	Pacific	National Total
Male	n	841	995	2,327	1,034	893	6,090
	N	1,180.6	719.6	2,251.1	230.2	656.7	5,038.2
Female	n	798	985	2,338	1,028	907	6,056
	N	1,276.5	750.8	2,369.9	234.5	676.9	5,308.6

[a] n = obtained number tested.
N = population in thousands.

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Table 5 presents a grade by sex breakdown of the sample across regions. The national census shows an eight percent decrement in student enrollment between Grades 10 and 11 and between Grades 11 and 12 for both males and females. The percent of decrease in the tested sample between grades is less than that for the population. The male sample showed decreases of five percent from Grade 10 to Grade 11, and four percent from 11 to 12. The female sample showed a decrease of five percent from Grade 10 to Grade 11, and virtually no decrease between Grades 11 and 12.

Table 5. Region by Grade by Male/Female Samples and Respective Populations[a]

		Northeast	Southeast	Central	Mountain	Pacific	National Total
GRADE 10							
Male	n	287	315	871	350	310	2133
	N	435.5	260.0	812.3	83.3	236.9	1828.0
Female	n	284	334	817	357	298	2090
	N	461.1	271.2	855.1	84.9	244.1	1916.4
GRADE 11							
Male	n	304	350	719	342	306	2021
	N	393.6	239.3	751.8	76.7	219.3	1680.7
Female	n	229	331	787	325	314	1986
	N	425.5	249.7	791.5	78.1	226.1	1770.9
GRADE 12							
Male	n	250	330	737	342	277	1936
	N	360.5	220.3	687.0	70.2	200.5	1538.5
Female	n	285	320	734	346	295	1980
	N	389.9	229.9	723.3	71.5	206.7	1621.3

[a] n = obtained number tested.
N = population in thousands.

Table 6 gives a grade by ethnicity by sex breakdown of the sample with the regions collapsed. The Black representation in this classification system is sufficient to compute reliable descriptive statistics.

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Table 6. Male/Female by Ethnicity by Grade: National Totals

Sex:		Male		Female	
Ethnicity:		Black	Other	Black	Other
Grade 10	n	373	1,760	331	1,759
	N	192.9	1,626.1	212.1	1,704.3
Grade 11	n	300	1,721	315	1,671
	N	178.1	1,502.6	196.0	1,574.9
Grade 12	n	292	1,644	306	1,674
	N	163.1	1,375.4	179.6	1,441.7
Total	n	965	5,125	952	5,104
	N	534.1	4,504.1	587.7	4,720.9

[a] n = obtained number tested.
N = population in thousands.

Table 7. Reference Groups for the Tabularized Normative Data

Table 8:	Subscales for the Vocational Interest-Career Examination Means and Standard Deviations by Sex
Table 9:	Subscales for the Vocational Interest-Career Examination Means and Standard Deviations by Grade by Sex
Table 10:	Subscales for the Vocational Interest-Career Examination Means and Standard Deviations by Region by Sex
Table 11:	Subscales for the Vocational Interest-Career Examination Means and Standard Deviations by Region by Grade by Sex
Table 12:	Subscales for the Vocational Interest-Career Examination Means and Standard Deviations by Race by Sex
Table 13:	Subscales for the Vocational Interest-Career Examination Means and Standard Deviations by Grade by Sex by Race

Distribution Characteristics

Means and standard deviations are given in Tables 8 through 13 for each of the 18 VOICE scales for the groups described in Table 7.

TABLE 8. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY SEX

SCALE	SCORE RANGE	REG = ALL GRADE= ALL SEX = M N = 6090		REG = ALL GRADE= ALL SEX = F N = 6056	
		MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	30.7	8.7	37.6	9.8
ELECTRONICS	20-60	37.4	9.9	27.2	8.3
HEAVY CONSTRUCTION	20-60	35.1	9.7	26.0	6.9
SCIENCE	20-60	35.8	9.9	32.7	9.9
OUTDOORS	15-45	34.9	7.0	34.8	6.0
MEDICAL SERVICE	20-60	31.8	9.2	39.3	9.9
AESTHETICS	15-45	24.0	6.8	28.2	7.4
MECHANICS	15-45	30.3	8.5	21.8	6.8
FOOD SERVICE	15-45	23.2	6.5	28.9	7.3
LAW ENFORCEMENT	15-45	27.4	6.8	24.6	6.3
AUDIOGRAPHICS	10-30	19.6	5.4	20.7	5.2
MATHEMATICS	12-36	19.8	6.4	19.9	6.5
AGRICULTURE	15-45	28.2	6.7	29.5	7.3
TEACHER/COUNSELING	10-30	17.0	5.0	20.6	5.2
MARKSMAN	7-21	14.6	4.1	10.0	3.2
CRAFTSMAN	7-21	10.1	2.7	11.5	2.9
DRAFTING	7-21	12.8	3.8	12.1	3.7
AUTOMATED DATA PROCESSING	7-21	12.4	3.9	12.6	3.9

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TABLE 9. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY GRADE BY SEX

SCALE	SCORE RANGE	REG = ALL GRADE = 10 SEX = M N = 2133		REG = ALL GRADE = 11 SEX = M N = 2021		REG = ALL GRADE = 12 SEX = M N = 1936	
		MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	30.0	8.1	30.7	8.9	31.6	9.2
ELECTRONICS	20-60	36.7	9.9	37.2	9.9	38.5	10.0
HEAVY CONSTRUCTION	20-60	34.9	9.6	34.9	9.7	35.6	9.7
SCIENCE	20-60	34.9	9.9	35.8	9.9	36.9	10.0
OUTDOORS	15-45	33.9	7.2	35.1	6.9	35.7	6.9
MEDICAL SERVICE	20-60	31.1	9.0	31.9	9.4	32.4	9.1
AESTHETICS	15-45	23.5	6.7	23.9	6.9	24.6	7.0
MECHANICS	15-45	29.9	8.5	30.3	8.6	30.7	8.5
FOOD SERVICE	15-45	23.1	6.4	23.0	6.5	23.5	6.6
LAW ENFORCEMENT	15-45	27.0	6.7	27.4	6.9	28.0	6.7
AUDIOGRAPHICS	10-30	19.1	5.4	19.6	5.4	20.3	5.4
MATHEMATICS	12-36	19.2	6.1	19.8	6.5	20.3	6.6
AGRICULTURE	15-45	27.9	6.7	28.2	6.7	28.7	6.7
TEACHER/COUNSELING	10-30	16.4	4.9	17.0	5.1	17.9	5.1
MARKSMAN	7-21	14.6	4.1	14.8	4.2	14.6	4.1
CRAFTSMAN	7-21	9.8	2.6	10.1	2.7	10.3	2.8
DRAFTING	7-21	12.4	3.7	12.8	3.8	13.2	3.8
AUTOMATED DATA PROCESSING	7-21	12.0	3.9	12.4	4.0	12.9	3.9

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TABLE 9. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION
MEANS AND STANDARD DEVIATIONS BY GRADE BY SEX (continued)

SCALE	SCORE RANGE	REG = ALL GRADE= 10 SEX = F N = 2090		REG = ALL GRADE= 11 SEX = F N = 1986		REG = ALL GRADE= 12 SEX = F N = 1980	
		MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	36.2	9.7	38.0	9.8	38.6	9.9
ELECTRONICS	20-60	26.9	8.1	27.4	8.5	27.3	8.4
HEAVY CONSTRUCTION	20-60	25.7	6.5	26.0	7.0	26.3	7.1
SCIENCE	20-60	32.1	9.8	33.3	9.9	32.7	10.0
OUTDOORS	15-45	34.1	6.1	35.0	6.0	35.4	5.9
MEDICAL SERVICE	20-60	38.8	9.9	39.8	9.9	39.2	10.0
AESTHETICS	15-45	27.1	7.4	28.5	7.2	29.0	7.6
MECHANICS	15-45	21.6	6.7	21.8	6.7	22.1	7.1
FOOD SERVICE	15-45	28.6	7.5	29.0	7.3	29.0	7.2
LAW ENFORCEMENT	15-45	24.1	6.2	24.8	6.3	24.8	6.4
AUDIOGRAPHICS	10-30	20.4	5.3	20.8	5.1	21.0	5.2
MATHEMATICS	12-36	19.4	6.3	20.2	6.7	20.0	6.5
AGRICULTURE	15-45	29.1	7.3	29.8	7.3	29.8	7.4
TEACHER/COUNSELING	10-30	19.8	5.3	21.0	5.2	21.1	5.2
MARKSMAN	7-21	9.9	3.1	9.9	3.1	10.1	3.3
CRAFTSMAN	7-21	11.4	2.9	11.7	2.9	11.7	2.8
DRAFTING	7-21	11.9	3.6	12.2	3.6	12.2	3.8
AUTOMATED DATA PROCESSING	7-21	12.2	3.9	12.8	3.9	12.8	3.9

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TABLE 10. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY REGION BY SEX

SCALE	SCORE RANGE	REG = 1 GRADE= ALL SEX = M N = 841		REG = 2 GRADE= ALL SEX = M N = 995		REG = 3 GRADE= ALL SEX = M N = 2327		REG = 4 GRADE= ALL SEX = M N = 1034		REG = 5 GRADE= ALL SEX = M N = 893	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	30.4	8.1	32.0	9.1	30.8	8.9	30.2	9.1	29.6	8.7
ELECTRONICS	20-60	36.0	9.9	38.4	9.9	38.0	9.9	38.6	10.0	36.4	9.9
HEAVY CONSTRUCTION	20-60	33.9	9.4	34.7	9.7	36.1	9.9	36.6	9.8	33.5	9.4
SCIENCE	20-60	36.3	9.8	36.2	9.9	35.5	10.0	36.7	10.0	35.4	9.9
OUTDOORS	15-45	34.9	6.4	34.6	6.9	35.0	7.2	37.0	6.6	33.8	7.6
MEDICAL SERVICE	20-60	32.3	9.2	33.0	9.3	31.4	9.2	32.1	9.4	30.6	8.8
AESTHETICS	15-45	24.1	6.7	24.8	6.7	23.7	6.9	24.3	7.2	24.0	7.0
MECHANICS	15-45	28.4	8.6	30.4	8.6	31.3	8.5	31.7	8.7	29.7	8.3
FOOD SERVICE	15-45	23.6	6.8	23.6	6.3	22.8	6.3	23.2	6.5	23.2	6.5
LAW ENFORCEMENT	15-45	27.3	6.7	27.5	6.9	27.6	6.8	28.2	6.9	26.7	6.9
AUDIOGRAPHICS	10-30	19.6	5.4	20.1	5.2	19.4	5.4	20.5	5.6	19.7	5.4
MATHEMATICS	12-36	19.8	6.4	20.5	6.2	19.5	6.4	19.9	6.6	19.7	6.4
AGRICULTURE	15-45	28.4	6.8	28.1	6.7	28.4	6.8	29.1	6.5	27.4	6.5
TEACHER/COUNSELING	10-30	17.1	5.1	17.7	4.9	16.9	5.0	17.1	5.2	16.6	5.1
MARKSMAN	7-21	14.1	4.3	14.8	4.2	15.1	4.1	15.3	4.3	13.7	4.0
CRAFTSMAN	7-21	9.8	2.7	10.5	2.8	10.1	2.7	10.1	2.7	9.9	2.6
DRAFTING	7-21	12.5	3.7	13.3	3.8	12.8	3.8	13.4	4.0	12.7	3.9
AUTOMATED DATA PROCESSING	7-21	11.9	3.9	12.9	3.9	12.5	3.9	12.6	4.1	12.3	4.0

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TABLE 10. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION MEANS AND STANDARD DEVIATIONS BY REGION BY SEX (continued)

SCALE	SCORE RANGE	REG = 1 GRADE= ALL SEX = F N = 798		REG = 2 GRADE= ALL SEX = F N = 985		REG = 3 GRADE= ALL SEX = F N = 2338		REG = 4 GRADE= ALL SEX = F N = 1028		REG = 5 GRADE= ALL SEX = F N = 907	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	35.6	9.4	39.5	9.9	38.7	9.9	37.5	10.0	34.9	9.9
ELECTRONICS	20-60	27.5	8.2	27.7	8.8	26.9	8.3	27.5	8.6	26.9	8.1
HEAVY CONSTRUCTIUN	20-60	26.6	7.1	25.7	6.9	25.7	6.8	26.7	7.2	25.6	6.5
SCIENCE	20-60	33.2	9.7	33.5	10.0	32.4	10.0	32.5	10.0	31.9	9.9
OUTDOORS	15-45	35.1	5.7	34.3	6.3	35.0	6.0	35.8	6.0	33.8	6.7
MEDICAL SERVICE	20-60	39.5	9.9	40.6	10.0	39.5	10.0	39.1	10.0	36.6	9.9
AESTHETICS	15-45	28.4	7.4	28.3	7.3	28.1	7.3	29.0	7.3	27.4	7.6
MECHANICS	15-45	22.1	6.6	21.8	7.0	21.6	6.9	22.4	7.2	21.8	6.7
FOOD SERVICE	15-45	29.8	7.2	28.6	7.3	28.7	7.4	29.7	7.3	27.8	7.4
LAW ENFORCEMENT	15-45	24.8	6.3	24.8	6.2	24.5	6.3	24.9	6.2	23.9	6.1
AUDIOGRAPHICS	10-30	20.8	5.1	20.8	5.3	20.7	5.3	21.2	5.0	20.4	5.3
MATHEMATICS	12-36	19.7	6.5	20.7	6.7	19.9	6.5	19.7	6.6	19.1	6.4
AGRICULTURE	15-45	30.7	7.3	28.8	7.3	29.2	7.3	30.2	7.2	29.1	7.5
TEACHER/COUNSELING	10-30	20.5	5.2	21.1	5.4	20.7	5.2	20.8	5.1	19.6	5.4
MARKSMAN	7-21	10.0	3.3	10.1	3.3	10.0	3.1	10.4	3.3	9.8	3.0
CRAFTSMAN	7-21	11.4	2.8	11.8	2.8	11.6	2.9	11.9	2.8	11.3	3.0
DRAFTING	7-21	12.3	3.7	12.4	3.8	11.9	3.7	12.1	3.6	11.8	3.7
AUTOMATED DATA PROCESSING	7-21	11.8	3.8	13.5	4.0	12.9	3.9	13.0	4.0	11.9	3.9

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TABLE 11. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY REGION BY GRADE BY SEX

SCALE	SCORE RANGE	REG=1 GRADE=10 SEX=M N=287		REG=2 GRADE=10 SEX=M N=315		REG=3 GRADE=10 SEX=M N=871		REG=4 GRADE=10 SEX=M N=350		REG=5 GRADE=10 SEX=M N=310	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	30.5	6.6	30.2	8.3	30.0	8.5	29.7	8.7	28.9	8.7
ELECTRONICS	20-60	36.3	9.7	37.1	10.0	37.0	9.9	39.4	10.0	35.4	9.9
HEAVY CONSTRUCTION	20-60	34.4	9.2	34.8	9.7	35.4	9.9	36.9	9.7	33.2	9.4
SCIENCE	20-60	35.9	9.6	34.2	9.9	34.7	10.0	35.8	10.0	34.1	9.9
OUTDOORS	15-45	34.2	6.6	33.5	7.1	34.0	7.4	36.7	6.6	32.7	7.7
MEDICAL SERVICE	20-60	31.7	8.8	31.3	8.8	31.1	9.2	32.0	9.3	29.5	8.8
AESTHETICS	15-45	23.7	6.4	24.0	6.4	23.5	6.9	23.2	6.9	23.1	6.7
MECHANICS	15-45	28.7	8.4	29.8	8.5	30.6	8.6	32.5	8.6	29.2	8.3
FOOD SERVICE	15-45	23.4	6.5	23.2	6.3	22.9	6.3	23.1	6.6	23.0	6.7
LAW ENFORCEMENT	15-45	27.1	6.3	26.7	6.9	27.3	6.8	28.3	6.5	25.4	7.0
AUDIOGRAPHICS	10-30	19.2	5.4	19.5	5.2	18.8	5.4	20.2	5.6	19.0	5.5
MATHEMATICS	12-36	19.4	6.1	19.2	5.7	19.1	6.2	19.5	6.5	19.2	6.1
AGRICULTURE	15-45	28.0	6.6	27.6	6.4	28.1	6.9	29.1	6.3	26.7	6.6
TEACHER/COUNSELING	10-30	16.5	4.8	16.5	4.7	16.5	5.0	16.3	4.9	15.6	4.8
MARKSMAN	7-21	14.3	4.0	14.5	4.1	14.9	4.0	15.7	4.3	13.5	4.1
CRAFTSMAN	7-21	9.4	2.4	10.2	2.8	10.0	2.7	9.8	2.6	9.6	2.5
DRAFTING	7-21	12.1	3.6	12.7	3.8	12.4	3.7	13.3	4.0	12.3	3.9
AUTOMATED DATA PROCESSING	7-21	12.0	3.9	12.1	3.8	12.0	4.0	12.3	4.1	11.8	3.9

TABLE 11. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY REGION BY GRADE BY SEX (continued)

SCALE	SCORE RANGE	REG = 1 GRADE = 10 SEX = F N = 284		REG = 2 GRADE = 10 SEX = F N = 334		REG = 3 GRADE = 10 SEX = F N = 817		REG = 4 GRADE = 10 SEX = F N = 357		REG = 5 GRADE = 10 SEX = F N = 298	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	34.8	8.8	38.6	10.0	37.0	10.0	37.2	10.0	33.4	9.9
ELECTRONICS	20-60	26.5	7.8	28.1	8.8	26.8	8.2	27.5	8.3	26.3	7.4
HEAVY CONSTRUCTION	20-60	26.0	6.5	26.1	6.7	25.5	6.6	26.4	6.9	25.1	6.2
SCIENCE	20-60	31.7	9.6	32.9	10.0	32.3	10.0	32.6	10.0	31.5	9.9
OUTDOORS	15-45	33.8	5.7	34.3	6.3	34.4	6.1	35.5	6.4	33.4	6.8
MEDICAL SERVICE	20-60	38.4	10.0	39.7	10.0	39.6	10.0	39.3	10.0	35.9	9.9
AESTHETICS	15-45	26.6	7.3	28.0	7.0	27.1	7.4	28.1	7.2	26.6	7.8
MECHANICS	15-45	21.3	6.2	22.2	7.0	21.6	7.0	22.3	7.0	21.6	6.7
FOOD SERVICE	15-45	29.7	6.9	28.9	7.7	28.3	7.6	29.6	7.1	27.1	7.9
LAW ENFORCEMENT	15-45	24.4	6.1	24.4	6.4	24.2	6.3	24.4	5.9	22.9	5.7
AUDIOGRAPHICS	10-30	20.4	5.1	21.0	5.4	20.3	5.4	20.6	5.2	20.2	5.4
MATHEMATICS	12-36	18.8	6.1	20.4	6.5	19.5	6.3	20.3	6.6	19.1	6.4
AGRICULTURE	15-45	29.5	7.3	28.7	7.4	29.0	7.1	29.8	7.4	28.4	7.6
TEACHER/COUNSELING	10-30	19.3	5.4	20.4	5.5	20.0	5.2	20.6	5.1	19.0	5.4
MARKSMAN	7-21	9.9	3.3	10.3	3.2	9.9	3.0	10.4	3.4	9.7	2.9
CRAFTSMAN	7-21	11.2	2.8	11.7	2.9	11.4	2.9	11.8	2.7	10.9	3.0
DRAFTING	7-21	11.9	3.5	12.3	3.7	11.8	3.7	11.9	3.6	11.7	3.7
AUTOMATED DATA PROCESSING	7-21	11.5	3.7	13.1	4.0	12.4	3.9	12.8	3.8	11.5	3.8

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TABLE 11. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY REGION BY GRADE BY SEX (continued)

SCALE	SCORE RANGE	REG = 1 GRADE = 11 SEX = M N = 304		REG = 2 GRADE = 11 SEX = M N = 350		REG = 3 GRADE = 11 SEX = M N = 719		REG = 4 GRADE = 11 SEX = M N = 342		REG = 5 GRADE = 11 SEX = M N = 306	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	30.0	8.8	32.9	9.4	30.5	8.9	29.8	9.0	30.2	8.8
ELECTRONICS	20-60	35.1	10.0	38.7	9.9	37.9	10.0	37.9	10.0	36.7	10.0
HEAVY CONSTRUCTION	20-60	33.5	9.7	34.5	9.7	36.0	9.8	35.9	9.7	33.5	9.5
SCIENCE	20-60	36.2	10.0	37.0	9.9	35.3	10.0	36.1	10.0	35.3	10.0
OUTDOORS	15-45	34.9	6.9	35.1	7.0	35.4	6.8	36.8	6.7	34.1	7.4
MEDICAL SERVICE	20-60	32.9	9.7	34.2	9.7	30.9	9.2	31.6	9.2	31.3	8.9
AESTHETICS	15-45	24.1	7.2	25.0	6.8	23.3	6.7	24.4	7.2	24.5	7.0
MECHANICS	15-45	28.0	8.9	30.7	8.7	31.4	8.6	31.1	8.8	30.0	8.3
FOOD SERVICE	15-45	23.5	6.9	24.1	6.6	22.3	6.2	22.8	6.1	23.5	6.4
LAW ENFORCEMENT	15-45	27.4	7.3	28.0	7.2	27.2	6.7	27.9	7.0	27.1	6.8
AUDIOGRAPHICS	10-30	19.6	5.4	20.3	5.1	19.3	5.4	20.4	5.5	19.9	5.3
MATHEMATICS	12-36	19.9	6.5	21.0	6.3	19.4	6.6	20.0	6.5	19.9	6.4
AGRICULTURE	15-45	28.4	7.4	28.6	6.7	28.2	6.5	28.6	6.7	27.5	6.4
TEACHER/COUNSELING	10-30	17.1	5.4	18.2	5.0	16.6	5.0	17.3	5.1	16.8	5.1
MARKSMAN	7-21	14.1	4.6	15.0	4.3	15.2	4.1	15.1	4.4	14.0	4.0
CRAFTSMAN	7-21	9.9	3.0	10.8	2.9	9.9	2.6	10.1	2.7	10.0	2.6
DRAFTING	7-21	12.5	3.7	13.6	3.8	12.7	3.9	13.3	4.0	12.6	3.9
AUTOMATED DATA PROCESSING	7-21	11.9	4.0	13.3	3.9	12.4	4.0	12.6	4.0	12.6	4.1

TABLE 11. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY REGION BY GRADE BY SEX (continued)

SCALE	SCORE RANGE	REG=1 GRADE=11 SEX=F N=229		REG=2 GRADE=11 SEX=F N=331		REG=3 GRADE=11 SEX=F N=787		REG=4 GRADE=11 SEX=F N=325		REG=5 GRADE=11 SEX=F N=314	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	35.6	9.7	39.5	9.9	39.7	9.9	37.1	10.0	35.3	10.0
ELECTRONICS	20-60	28.1	8.2	28.0	9.2	26.9	8.3	27.2	8.6	27.6	9.0
HEAVY CONSTRUCTION	20-60	26.4	7.3	25.9	7.3	25.7	6.7	26.3	6.9	26.2	7.1
SCIENCE	20-60	35.0	9.7	34.1	10.0	32.6	10.0	32.2	10.0	32.2	10.0
OUTDOORS	15-45	35.7	5.5	34.1	6.1	35.2	6.1	35.5	6.2	34.1	6.6
MEDICAL SERVICE	20-60	41.0	9.9	41.3	10.0	39.6	10.0	38.0	10.0	36.9	10.0
AESTHETICS	15-45	29.6	6.9	28.1	7.4	28.2	7.2	28.8	7.4	27.6	7.4
MECHANICS	15-45	22.1	6.3	21.6	7.0	21.4	6.7	22.4	7.4	22.4	6.9
FOOD SERVICE	15-45	29.7	7.4	28.6	7.1	28.9	7.4	29.5	7.7	28.2	7.0
LAW ENFORCEMENT	15-45	24.8	6.3	25.1	6.1	24.7	6.2	25.0	6.3	24.7	6.6
AUDIOGRAPHICS	10-30	20.9	5.0	20.8	5.3	20.8	5.1	21.5	4.9	20.7	5.5
MATHEMATICS	12-36	20.7	6.8	20.8	6.7	20.2	6.8	19.4	6.6	19.1	6.4
AGRICULTURE	15-45	31.5	7.1	28.8	7.2	29.1	7.3	29.9	7.3	29.9	7.5
TEACHER/COUNSELING	10-30	21.4	5.2	21.2	5.4	21.1	5.0	20.5	5.2	19.7	5.4
MARKSMAN	7-21	10.1	3.1	9.9	3.1	9.9	3.2	10.2	3.2	10.0	3.2
CRAFTSMAN	7-21	11.5	2.9	12.0	2.8	11.6	2.8	11.7	2.8	11.6	3.1
DRAFTING	7-21	12.5	3.6	12.5	3.8	12.0	3.6	12.0	3.5	12.0	3.7
AUTOMATED DATA PROCESSING	7-21	12.0	3.7	13.7	4.0	13.1	3.9	13.1	4.3	12.3	4.1

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TABLE 11. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY REGION BY GRADE BY SEX (continued)

SCALE	SCORE RANGE	REG = 1 GRADE = 12 SEX = M N = 250		REG = 2 GRADE = 12 SEX = M N = 330		REG = 3 GRADE = 12 SEX = M N = 737		REG = 4 GRADE = 12 SEX = M N = 342		REG = 5 GRADE = 12 SEX = M N = 277	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	30.5	9.0	33.3	9.7	32.1	9.3	31.1	9.6	29.9	8.7
ELECTRONICS	20-60	36.6	10.0	39.5	10.0	39.5	10.0	38.3	10.0	37.2	10.0
HEAVY CONSTRUCTION	20-60	33.8	9.3	34.9	9.8	37.1	9.9	36.9	10.0	33.9	9.3
SCIENCE	20-60	36.8	10.0	37.7	10.0	36.5	10.0	38.4	10.0	36.8	10.0
OUTDOORS	15-45	35.7	5.8	35.5	6.7	35.8	7.2	37.5	6.6	34.8	7.8
MEDICAL SERVICE	20-60	32.5	9.1	33.8	9.6	32.2	9.1	32.8	9.7	31.2	8.5
AESTHETICS	15-45	24.6	6.6	25.5	6.9	24.3	7.1	25.3	7.7	24.4	7.4
MECHANICS	15-45	28.6	8.6	31.0	8.6	32.0	8.4	31.3	8.9	29.9	8.3
FOOD SERVICE	15-45	24.0	6.9	23.7	6.2	23.2	6.5	23.6	6.8	23.2	6.4
LAW ENFORCEMENT	15-45	27.5	6.4	27.8	6.7	28.4	6.8	28.5	7.3	27.7	6.8
AUDIOGRAPHICS	10-30	20.0	5.4	20.7	5.1	20.2	5.3	20.9	5.7	20.4	5.5
MATHEMATICS	12-36	20.1	6.6	21.3	6.5	20.1	6.6	20.5	6.7	20.2	6.8
AGRICULTURE	15-45	28.8	6.4	28.2	6.9	29.0	6.9	29.7	6.6	28.0	6.6
TEACHER/COUNSELING	10-30	17.8	5.1	18.6	5.1	17.7	5.0	17.9	5.7	17.6	5.4
MARKSMAN	7-21	13.7	4.2	14.9	4.2	15.2	4.1	15.1	4.2	13.6	4.1
CRAFTSMAN	7-21	10.1	2.7	10.6	2.8	10.3	2.9	10.5	2.9	10.1	2.7
DRAFTING	7-21	13.0	3.8	13.6	3.8	13.3	3.9	13.6	4.0	13.1	3.9
AUTOMATED DATA PROCESSING	7-21	11.9	3.8	13.5	3.8	13.2	3.9	13.0	4.4	12.6	4.2

TABLE 11. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY REGION BY GRADE BY SEX (continued)

SCALE	SCORE RANGE	REG = 1 GRADE= 12 SEX = F N = 285		REG = 2 GRADE= 12 SEX = F N = 320		REG = 3 GRADE= 12 SEX = F N = 734		REG = 4 GRADE= 12 SEX = F N = 346		REG = 5 GRADE= 12 SEX = F N = 295	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	36.7	9.9	40.4	10.0	39.9	9.9	38.2	10.0	36.1	10.0
ELECTRONICS	20-60	28.0	8.5	26.9	8.4	27.1	8.4	28.0	9.2	26.9	7.9
HEAVY CONSTRUCTION	20-60	27.6	7.5	25.1	6.5	26.0	7.3	27.4	7.9	25.5	6.1
SCIENCE	20-60	33.1	10.0	33.7	10.0	32.5	10.0	32.6	10.0	32.0	10.0
OUTDOORS	15-45	36.0	5.8	34.6	6.5	35.5	5.6	36.4	5.3	34.0	6.7
MEDICAL SERVICE	20-60	39.2	10.0	40.8	10.0	39.3	10.0	40.2	10.0	37.0	10.0
AESTHETICS	15-45	29.2	7.9	29.0	7.7	29.1	7.3	30.2	7.3	28.2	7.8
MECHANICS	15-45	23.0	7.3	21.7	7.0	21.9	7.2	22.6	7.2	21.5	6.5
FOOD SERVICE	15-45	30.0	7.4	28.3	7.1	28.8	7.0	29.9	7.2	28.3	7.2
LAW ENFORCEMENT	15-45	25.3	6.6	25.0	6.2	24.7	6.5	25.4	6.3	24.2	6.0
AUDIOGRAPHICS	10-30	21.3	5.3	20.5	5.2	21.1	5.3	21.6	5.0	20.2	5.0
MATHEMATICS	12-36	19.8	6.7	20.9	6.9	20.1	6.4	19.3	6.6	19.1	6.3
AGRICULTURE	15-45	31.3	7.5	28.8	7.5	29.4	7.3	30.9	7.1	29.2	7.6
TEACHER/COUNSELING	10-30	21.0	5.0	21.9	5.3	21.1	5.3	21.3	5.1	20.1	5.3
MARKSMAN	7-21	10.2	3.3	10.0	3.5	10.2	3.3	10.5	3.4	9.6	2.9
CRAFTSMAN	7-21	11.6	2.7	11.6	2.8	11.8	2.9	12.2	3.0	11.3	2.9
DRAFTING	7-21	12.5	4.0	12.4	3.8	12.1	3.8	12.2	3.7	11.9	3.7
AUTOMATED DATA PROCESSING	7-21	11.9	3.9	13.7	4.1	13.3	3.9	13.2	4.1	11.9	3.8

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TABLE 12. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION
MEANS AND STANDARD DEVIATIONS BY RACE BY SEX

SCALE	SCORE RANGE	REG=ALL GRADE=ALL SEX=M RACE=BLK N=965		REG=ALL GRADE=ALL SEX=M RACE=OTH N=5125		REG=ALL GRADE=ALL SEX=F RACE=BLK N=952		REG=ALL GRADE=ALL SEX=F RACE=OTH N=5104	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	35.3	8.9	30.2	8.7	38.5	9.3	37.4	9.9
ELECTRONICS	20-60	38.5	9.7	37.3	10.0	30.4	8.6	26.8	8.3
HEAVY CONSTRUCTION	20-60	34.0	8.7	35.2	9.8	26.6	7.0	25.9	6.9
SCIENCE	20-60	36.5	9.6	35.7	10.0	33.9	9.4	32.6	10.0
OUTDOORS	15-45	31.8	6.3	35.2	7.1	30.2	6.6	35.4	6.0
MEDICAL SERVICE	20-60	34.8	8.7	31.4	9.2	39.3	9.9	39.2	10.0
AESTHETICS	15-45	26.5	6.6	23.7	6.9	28.0	7.0	28.2	7.4
MECHANICS	15-45	29.2	7.2	30.4	8.7	22.7	6.5	21.7	6.9
FOOD SERVICE	15-45	25.9	6.9	22.9	6.4	28.7	7.3	28.9	7.3
LAW ENFORCEMENT	15-45	26.2	6.2	27.6	6.9	24.3	6.0	24.6	6.3
AUDIOGRAPHICS	10-30	20.5	4.9	19.6	5.4	19.8	4.8	20.8	5.3
MATHEMATICS	12-36	21.1	5.6	19.6	6.5	21.6	6.4	19.7	6.5
AGRICULTURE	15-45	26.4	6.5	28.5	6.7	24.4	6.2	30.2	7.4
TEACHER/COUNSELING	10-30	18.6	4.8	16.8	5.1	20.8	4.9	20.5	5.3
MARKSMAN	7-21	13.3	3.6	14.8	4.2	10.1	3.1	10.0	3.2
CRAFTSMAN	7-21	11.5	3.2	9.9	2.7	12.1	2.9	11.5	2.8
DRAFTING	7-21	13.2	3.6	12.8	3.8	12.3	3.5	12.0	3.7
AUTOMATED DATA PROCESSING	7-21	14.0	3.7	12.2	4.0	14.0	3.7	12.4	3.9

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TABLE 13. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY GRADE BY SEX BY RACE

SCALE	SCORE RANGE	REG = ALL GRADE = 10 SEX = M RACE = BLK N = 373		REG = ALL GRADE = 10 SEX = M RACE = OTH N = 1760		REG = ALL GRADE = 10 SEX = F RACE = BLK N = 331		REG = ALL GRADE = 10 SEX = F RACE = OTH N = 1759	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	35.2	8.9	29.4	8.0	35.8	9.1	36.3	9.7
ELECTRONICS	20-60	37.8	9.3	36.6	10.0	28.6	8.1	26.7	8.1
HEAVY CONSTRUCTION	20-60	33.9	8.3	35.0	9.7	25.5	6.3	25.7	6.6
SCIENCE	20-60	35.7	9.1	34.8	10.0	31.8	8.9	32.2	10.0
OUTDOORS	15-45	30.8	6.3	34.3	7.3	28.2	6.2	34.9	6.1
MEDICAL SERVICE	20-60	34.2	8.6	30.7	9.0	38.3	9.9	38.9	10.0
AESTHETICS	15-45	26.7	6.6	23.2	6.7	27.0	7.5	27.1	7.3
MECHANICS	15-45	28.8	6.8	30.1	8.7	21.4	6.1	21.7	6.8
FOOD SERVICE	15-45	26.2	7.0	22.7	6.3	29.1	7.2	28.5	7.5
LAW ENFORCEMENT	15-45	25.7	5.7	27.1	6.8	23.9	6.1	24.2	6.2
AUDIOGRAPHICS	10-30	19.8	4.8	19.0	5.5	18.7	4.8	20.6	5.3
MATHEMATICS	12-36	21.1	5.4	19.0	6.2	20.5	6.0	19.3	6.3
AGRICULTURE	15-45	26.4	6.6	28.0	6.7	23.3	6.1	29.8	7.4
TEACHER/COUNSELING	10-30	18.3	4.8	16.1	4.9	19.7	5.1	19.8	5.3
MARKSMAN	7-21	13.0	3.3	14.8	4.2	9.8	2.8	10.0	3.1
CRAFTSMAN	7-21	11.2	2.9	9.7	2.6	11.7	3.0	11.3	2.8
DRAFTING	7-21	13.0	3.3	12.3	3.8	12.3	3.4	11.8	3.7
AUTOMATED DATA PROCESSING	7-21	13.6	3.7	11.8	3.9	12.7	3.6	12.1	3.9

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TABLE 13. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION

MEANS AND STANDARD DEVIATIONS BY GRADE BY SEX BY RACE (continued)

SCALE	SCORE RANGE	REG = ALL GRADE = 11 SEX = M RACE = BLK N = 300		REG = ALL GRADE = 11 SEX = M RACE = OTH N = 1721		REG = ALL GRADE = 11 SEX = F RACE = BLK N = 315		REG = ALL GRADE = 11 SEX = F RACE = OTH N = 1671	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	35.4	8.9	30.1	8.9	40.3	9.0	37.7	10.0
ELECTRONICS	20-60	38.7	9.9	37.0	10.0	31.9	8.7	26.9	8.5
HEAVY CONSTRUCTION	20-60	34.2	8.7	35.0	9.8	26.6	7.8	25.9	6.9
SCIENCE	20-60	35.8	9.9	35.8	10.0	36.5	9.5	32.9	10.0
OUTDOORS	15-45	31.9	6.2	35.5	7.0	31.0	6.4	35.5	6.0
MEDICAL SERVICE	20-60	35.6	9.1	31.5	9.4	41.8	9.8	39.5	10.0
AESTHETICS	15-45	26.2	6.9	23.7	6.9	29.2	6.2	28.4	7.3
MECHANICS	15-45	29.8	7.3	30.3	8.8	23.2	6.4	21.6	6.8
FOOD SERVICE	15-45	25.8	6.7	22.7	6.4	28.2	7.4	29.1	7.3
LAW ENFORCEMENT	15-45	26.6	6.9	27.5	7.0	24.6	5.9	24.8	6.3
AUDIOGRAPHICS	10-30	21.0	5.2	19.5	5.4	20.4	4.6	20.9	5.2
MATHEMATICS	12-36	20.8	5.7	19.7	6.6	22.9	6.7	19.9	6.7
AGRICULTURE	15-45	25.9	6.8	28.5	6.7	25.3	6.0	30.3	7.4
TEACHER/COUNSELING	10-30	18.6	5.1	16.8	5.1	21.8	4.6	20.9	5.2
MARKSMAN	7-21	13.7	3.9	14.9	4.3	10.1	3.1	9.9	3.1
CRAFTSMAN	7-21	11.8	3.5	9.9	2.6	12.5	3.1	11.5	2.8
DRAFTING	7-21	13.2	3.8	12.8	3.8	12.6	3.6	12.1	3.6
AUTOMATED DATA PROCESSING	7-21	14.2	3.8	12.2	4.0	14.8	3.5	12.6	3.9

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TABLE 13. SUBSCALES FOR THE VOCATIONAL INTEREST-CAREER EXAMINATION MEANS AND STANDARD DEVIATIONS BY GRADE BY SEX BY RACE (continued)

SCALE	SCORE RANGE	REG = ALL GRADE = 12 SEX = M RACE = BLK N = 292		REG = ALL GRADE = 12 SEX = M RACE = OTH N = 1644		REG = ALL GRADE = 12 SEX = F RACE = BLK N = 306		REG = ALL GRADE = 12 SEX = F RACE = OTH N = 1674	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
OFFICE ADMINISTRATION	20-60	35.4	9.0	31.1	9.2	39.8	9.9	38.5	10.0
ELECTRONICS	20-60	39.2	10.0	38.4	10.0	30.9	9.1	26.9	8.3
HEAVY CONSTRUCTION	20-60	34.1	9.1	35.8	9.7	27.8	7.0	26.1	7.1
SCIENCE	20-60	38.1	10.0	36.8	10.0	33.4	10.0	32.6	10.0
OUTDOORS	15-45	32.6	6.3	36.1	6.9	31.7	7.4	35.8	5.7
MEDICAL SERVICE	20-60	34.5	8.5	32.1	9.2	37.9	10.0	39.4	10.0
AESTHETICS	15-45	26.7	6.3	24.4	7.1	28.0	7.1	29.2	7.6
MECHANICS	15-45	29.1	7.5	30.9	8.6	23.6	7.1	21.9	7.1
FOOD SERVICE	15-45	25.6	6.9	23.2	6.5	28.8	7.2	29.0	7.2
LAW ENFORCEMENT	15-45	26.3	6.0	28.2	6.8	24.5	6.0	24.9	6.5
AUDIOGRAPHICS	10-30	20.7	4.9	20.3	5.4	20.5	5.0	21.0	5.3
MATHEMATICS	12-36	21.2	5.9	20.2	6.7	21.5	6.6	19.8	6.5
AGRICULTURE	15-45	26.9	6.0	28.9	6.3	24.8	6.6	30.4	7.5
TEACHER/COUNSELING	10-30	19.0	4.4	17.7	5.2	20.9	5.1	21.1	5.2
MARKSMAN	7-21	13.4	3.7	14.7	4.2	10.7	3.4	10.0	3.3
CRAFTSMAN	7-21	11.7	3.1	10.1	2.8	12.1	2.8	11.6	2.8
DRAFTING	7-21	13.5	3.6	13.2	3.9	12.0	3.6	12.2	3.8
AUTOMATED DATA PROCESSING	7-21	14.2	3.7	12.7	4.0	14.5	4.0	12.6	3.9

Male/Female. Table 8 indicates that male students tend to report greater interest than do females on the Electronics, Heavy Construction, Science, Mechanics, Law Enforcement, and Marksman scales of the VOICE. Female students have higher mean scores on the Office Administration, Medical Service, Aesthetics, Food Service, Audiographics, Agriculture, Teacher/Counseling, and Craftsman scales. The two groups have approximately equal means on the Outdoors, Math, Drafting, and Data Processing scales. These outcomes seem quite predictable. In fact, these patterns of interest parallel those found in the job satisfaction study (Alley, et al., 1976), with one exception. The sample in the present study showed males to have a somewhat higher expressed interest in Science than did females, whereas the previous study found equivalent interest for the two groups. For the most part, the previous study, based on the data of 22,745 male and female Air Force recruits, obtained mean scale scores and standard deviations that were slightly higher than those of the present national sample of high school students.

Grade by Sex. Table 9 indicates that male students tend to express slight increases in interest, in most vocations, as a group, as their grade level increases. The only exception to this is with respect to the Marksman scale, where male interest seems quite stable over the grades. Interest in the vocational scales tends to increase with time for the female students also, but a stabilizing of interest seems to occur earlier for them, in that there is virtually no change after the 11th grade for 8 of the VOICE scales.

Region by Sex. Regional differences in the expressed interests of male students are very slight (Table 10). Males in the Pacific West region tend to have the lowest mean scores, and the Southeast and Mountain region males tend to have the highest. Because of large sample sizes, a small difference between means can be statistically significant. For example, small but significant differences between the Mountain and Pacific regional means for males were found for the Heavy Construction, Outdoors, Agriculture, and Marksman scales.

Similarly, Southeastern female students differed from their Pacific West counterparts in showing slightly, but significantly more interest in Office Administration, Medical Service, Teacher/Counseling and ADP. A number of other small mean scale score differences are significant between pairs of regions, but few dramatically so.[1]

Region by Grade by Sex. A comaprison of mean scores across regions for tenth grade males indicates a tendency for the highest interests to be expressed in the Mountain region, and the lowest in the Pacific region (Table 11). This pattern changes for eleventh grade males, who show the highest interests, on the whole, for those who come from the Southeast, and the lowest interests for those from the Central region. Differences among regions are very small for twelfth grade males, and no systematic pattern emerges. In all cases the trends indicated above refer to differences between mean scores that are too small to be practical.

The data for female students are somewhat more stable across grades in that the Pacific West region tends to yield the lowest mean scale scores at all grade levels. The higher expressed interests, however, change geographically with grade: the highest tenth grade means are seen for the Southeast and the Mountain West; the highest eleventh grade means tend to show up in the Northeast; and the highest twelfth grade means are dispersed over the Northeast, Southeast, and Mountain West. Again, the regional differences in vocational interest across grades are too small to be of practical value.

Race by Sex. Both the Black male and female groups tend to show significantly higher mean scores on most of the VOICE scales than do the non-Black groups (Tables 12 and 14). This is especially true for the Office Administration, Electronics, Mathematics, Teacher/Counseling, Craftsman, and Data Processing Scales. Non-Blacks tend to report higher interest on the Outdoors, Agriculture, and Marksman scales. Although most of the t-test results on which these observations are based are

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[1] Regional t-test results are not tabulated in this report.

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Table 14. SELECTED t - RATIO RESULTS

SCALE	MALES			FEMALES		
	MEAN 1 BLACK N = 965	MEAN 2 OTHER N = 5125	t	MEAN 1 BLACK N = 952	MEAN 2 OTHER N = 5104	t
OFFICE ADMINISTRATION	35.3	30.2	16.6**	38.5	37.4	3.2**
ELECTRONICS	38.5	37.3	3.4**	30.4	26.8	12.2**
HEAVY CONSTRUCTION	34.0	35.2	-3.6**	26.6	25.9	2.9**
SCIENCE	36.5	35.7	2.3*	33.9	32.6	3.7**
OUTDOORS	31.8	35.2	-13.9**	30.2	35.4	-24.2**
MEDICAL SERVICE	34.8	31.4	10.6**	39.3	39.2	0.3
AESTHETICS	26.5	23.7	11.6**	28.0	28.2	-0.8
MECHANICS	29.2	30.4	-4.0**	22.7	21.7	4.1**
FOOD SERVICE	25.9	22.9	13.2**	28.7	28.9	-0.8
LAW ENFORCEMENT	26.2	27.6	-5.9**	24.3	24.6	-1.4
AUDIOGRAPHICS	20.5	19.6	4.8**	19.8	20.8	-5.4**
MATHEMATICS	21.1	19.6	6.7**	21.6	19.7	8.3**
AGRICULTURE	26.4	28.5	-9.0**	24.4	30.2	-22.8**
TEACHER/COUNSELING	18.6	16.8	10.2**	20.8	20.5	1.6
MARKSMAN	13.3	14.8	-10.4**	10.1	10.0	0.9
CRAFTSMAN	11.5	9.9	16.4	12.1	11.5	6.0**
DRAFTING	13.2	12.8	3.0**	12.3	12.0	2.3*
AUTOMATED DATA	14.0	12.2	13.0**	14.0	12.4	11.7**

* SIG. AT P < .05
** SIG. AT P ≤ .01

highly significant, an examination of the means in Table 12 shows the actual mean score differences between Blacks and non-Blacks to range from one-tenth of a point (Marksman, female data) to 5.8 points (Agriculture, female, non-Blacks higher). The largest difference between the mean score of male Blacks and non-Blacks was for Office Administration (5.2 points, Blacks higher). Since the Agriculture scale has only 30 items, the 5.8 point difference is more dramatic than the result for the 40-item Office Administration scale.

Table 12 compares interests between Black and non-Black male and female students. Black males indicate more interest as a group (have higher mean scores) than do the non-Black males on the Office Administration, Electronics, Science, Medical Service, Aesthetics, Food Service, Audiographics, Mathematics, Teacher Counseling, Craftsman, Drafting, and Data Processing scales. Non-Black males have higher mean scores on the Heavy Construction, Outdoors, Agriculture, Marksman, Mechanics, and Law Enforcement scales.

Black females have higher mean scores than do non-Black females on the Office Administration, Electronics, Heavy Construction, Science, Mechanics, Mathematics, Teacher/Counseling, Craftsman, Drafting, and Data Processing scales. Non-Black females have higher mean scores on the Outdoors, Law Enforcement, Audiographics, and Agriculture scales. Means were virtually the same for the two groups on Marksman, Medical Service, Aesthetics and Food Service scales.

Grade by Sex by Race. The pattern of Black vs. non-Black differences in vocational interests shows virtually no change across grades (Table 13). Interests tend to increase within each racial group, but the direction of between-group differences is generally maintained throughout high school. Although the direction of the differences between the mean scores of Black and non-Black females persisted across grades, the sizes of these differences tended to diminish more than they did for males as grade level rose.

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IV. DISCUSSION AND RECOMMENDATIONS

Group Norms and Group Differences

Vocational interest data for minority groups has been almost non-existent. It was the intention of AFHRL in sponsoring this study to remedy this lack with respect to Black students, in addition to establishing regional male and female norms for the VOICE scales. The number of Black students who participated in the study was considerably less than planned, but was sufficient for establishing national norms for Black males and females in grades 10, 11, and 12. The sample sizes for the other groups were higher than anticipated, amounting to a sound data base for the VOICE norms.

The extent of spread of scores on any scale did not appear to distinguish between groups and differences in standard deviations were not consistent with respect to scale or group (Tables 8 through 13). Every set of comparison groups showed statistically significant mean score differences on one scale or another. Except for predictable male-female differences the actual differences in number of points were usually small. It is suggested that these small differences be considered in noting that the strongest results were:

1. Both male and female groups in the Pacific West had the lowest mean scores of any region on most of the VOICE scales.

2. Black male and female groups tended to express higher interests than did non-Blacks on at least eight scales rather consistently across regions (Office Administration, Electronics, Science, Mathematics, Teacher/Counseling, Craftsman, Drafting, Data Processing), while non-Blacks showed high interest more strongly on only two (Outdoors and Agriculture).

3. Reported vocational interest on virtually all of the scales tended to increase as grade level increased, except that scores tended to stabilize in the 11th grade for female groups.

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The Scales. If degree of group interest in a vocation is implied by the position of the mean with respect to the midpoint of the scale score range, the vocational scales that elicited the most interest for males were Outdoors, Mechanics, and Marksman. These were the only areas in which means were higher than midpoints. Using this criterion, the scales of most interest to the female students were Outdoors, Audiographics, and Teacher/Counseling. Means were at the midpoints for the female group for Medical Service and Agriculture.

Use of Group Norms. The norming and standardization of the VOICE scales were intended as a field study, not a test of an hypothesis that there are differences of vocational interest between regional groups or between ethnic groups. The apparent differences found in the samples should be treated with caution to avoid concluding that true differences between the regional or ethnic populations exist. The size of t capitalizes on sample size, which was high in this study (Table 14). It is the practical utility that should be considered. If Black male students differ from other males slightly on nine of the VOICE scales, should guidance counselors use separate norms for them? What is the value to the Black student of knowing that, with a raw score of 17 on Craftsman (the scale showing the highest t between Black and Other Males), he is at the 96th percentile on Black norms and at the 99th on the norms for Other Males? With respect to providing a reference work for counselors, it is recommended that national male and female VOICE norms, undifferentiated as to race, be provided in a manual. For the sake of completeness, an appendix can be made available containing differential norms (region and race) only for the scales that distinguished significantly between groups.

The finding that interest on most scales increases with grade level suggests that the national norms should be based on the Grade 12 data, or, for the sake of sample size, that the Grade 10 data be deleted and national norms be recomputed by combining the data for Grades 11 and 12.

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Practical Considerations for Future Studies

Sampling of Schools. Schools should be overselected to compensate for non-respondents and for refusals. In planning the initial selection number, it should be kept in mind that approximately 20 percent of those who agree to participate may not meet the commitment, as occurred with this study. Reasons given included severe economic constraints, particularly in the Northeast; changing of school staff; unexpected schedule changes due to weather or other factors; belated refusals from local education boards; and high absentee rates. An overselection factor of at least five is recommended.

VOICE Administration Time. Only 250 of the 400 items on the VOICE questionnaire appear on the 18 scales. The time taken to complete the 400-item questionnaire frequently extended to one and a half hours, particularly in areas where reading aptitude is low. The administration time was a problem not only because of the constraints of class schedules but also because some students tended to become bored and impatient. In these cases, answer sheets were frequently defaced by drawings or pithy comments. Since only 250 items are necessary to compute scale score values, it is recommended that the remaining 150 be deleted, if only to save testing time.

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